

pendix, and I believe it to be thoroughly reliable for all classes of work. The training of the Sappers commenced on the 1st January, 1874, and with the aid of the photo-heliograph lent by Sir G. Airy for the purposes of instruction, they were *au fait* at the process about May, soon after which, the first expedition started for Kerguelin's land. During most of that time Lieut. Darwin was able at intervals to come to Chatham, keeping up his work at the Observatory at Greenwich at the same time.

I need not enter into the details of the instruments employed at each station. Suffice it to say that each party was furnished with an altazimuth, a transit instrument, and equatorially mounted telescopes (none less than 4½-inch) for each observer. The amount of forethought necessarily expended on the supplies and comforts for each expedition was immense, and none laboured so hard as Captain Tupman, R.M.A. He had been nominated by the Astronomer Royal as chief of the transit of Venus parties, and to him all looked for completing each outfit. It was an arduous task, but not quite an unthankful one, as owing to his readiness to afford help and information, the parties after their return had no omission to reproach him with. The arrangements also involved a large increase in the work of the Astronomer Royal and of his chief assistant, Mr. W. H. M. Christie; their kindness and attention to the wants of all smoothed away difficulties after difficulties as they cropped up.

The Astronomer Royal had chosen the stations for the English parties principally to obtain results by Delisle's method, which was dependent on the accurate observation of the times of 1st or 2nd apparent internal contact of Venus with the limb of the sun, together with a close determination of the longitude of each station. If a figure be drawn showing the double zone formed by the shadow of Venus, and remembering that the planet crossed over the northern half of the sun's surface, it will be seen that certain places in the northern hemisphere would come into apparent internal contact with the inner zone sooner than localities in the southern hemisphere at ingress, whilst at egress the reverse would be the case. The difference in time of the observed contacts furnish the data by which the planet's distance (and hence the sun's distance) can be calculated. A glance at the accompanying map will show that the Russian Government expeditions occupied a line across Siberia and on to Japan, and it will be further noted that, owing to the prevailing bad weather, and to the low altitude of the sun, in the majority of cases the observations were unsuccessful. In Egypt, however, where there were parties of various nationalities, the necessary contacts at egress were observed, and they give ample data for Delisle's method, when the southern stations, which observed the same contacts, are taken into consideration. The most favourable stations, where successful observations for Halley's method were taken, will be at once seen in the map; that is those where the difference of the length of the chords, as measured by the interval of time elapsing between internal and external contacts, is greatest. For both methods it will be seen (if the observations have been well made) that the stations marked "successful" will give pairs, which, when combined, should give an accurate determination of the planet's distance. It can hardly be expected, however, that some discrepancies may not arise with visual observations, but supposing that